



ELECTRODE PLATE FOR BATTERY, NONAQUEOUS ELECTROLYTE BATTERY,

AND PROCESS FOR PRODUCING THEREOF

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to an electrode plate for a nonaqueous electrolyte battery. Particularly, it relates to an electrode plate for a battery which avoids breaking of an electrode plate in pressing step of its production process, a nonaqueous electrolyte battery, and processes for producing thereof.

Description of the Related Art

In recent years, the technology of audio-video equipment[[s]], personal computers or the like has advanced to be cordless and portable, and this advance has required reduction in size and weight as well as higher energy density to batteries used as driving power sources of these equipments. For these demands, there have been proposed nonaqueous electrolyte batteries having high energy density and high voltage, typically, a lithium ion secondary battery, in place of conventional alkaline batteries. Generally, a nonaqueous electrolyte battery is structured by the steps of: furnishing each of positive and negative electrode plates with a terminal to pass an electric current out from each

electrode plate; winding up the electrode plates vorticosely together with a separator disposed between the electrode plates in order to prevent short-circuit between the electrode plates; inserting the electrode plates with the separator into a battery case filled with a nonaqueous electrolyte through its opening; and sealing the opening to form a sealed opening.

Feature size of a nonaqueous electrolyte battery is desired to become thinner and smaller due to the trend of equipment[[s]] as becoming thinner and smaller and for the purpose of efficient use of space. In terms of performance, it is desired to elongate life span of a charge/discharge cycle and to realize higher energy density. To meet these demands, an electrode plate for a battery before winding is pressed to form a thin layer. If the electrode plate is made of a collector having electrode active material layers formed intermittently on both surfaces, due to the pressure generated by the press-working, the electrode active material layers are likely to be peeled and chipped, and the collector is easily broken depending on a positional relationship of the electrode active material layers on both surfaces of the collector. Particularly, a raised portion is created at a starting side in the coating process of the electrode active material layer. If a position of said raised portion coincides with a position of a starting or a finishing sides in the coating process of an electrode active material layer formed on the other surface, bending stress and tension are generated at boundary between said raised portion and its surrounding area. Thus, the collector receives stress which leads to hardening of the collector, and

process one another and thereby a starting side and a finishing side face each other, and a starting side and a starting side cannot be faced with a collector disposed between the coating sections. Thus, it is a defect of this method that a total number of boundaries (peaks) of raised portions existing at both surfaces of the collector is twice as many as that existing at one surface of the same size in area. Thereby, it is more likely that number of breakable portions doubles or chipping of an electrode active material layer is caused.

Additionally, JP-A No. 2001-15103, JP-A No. 2001-351610 and JP-A No. 2002-124249 also discloses prior arts of an electrode plate.

SUMMARY OF THE INVENTION

In view of the above-mentioned problems, an object of the present invention is to provide an electrode plate for a battery in which an electrode active material layer is not likely to be damaged (peeling, chipping, cracking or the like, but especially chipping), a collector is not likely to be broken during production process, it is large in yield, and production is capable at low cost, a nonaqueous electrolyte battery using such an electrode plate, and processes for producing thereof.

In order to achieve the above object, an electrode plate for a battery of the present invention is comprised of a collector in a sheet-like form, an electrode active material layer (a first electrode active material layer) intermittently formed on one